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Abstract

Use of Artery Position as a Verification Quality Assurance Test of Angiogram-CT Image Registration Accuracy for Mask-Based Immobilization of AVM Patients

Christopher Serago [1] , Steven Herchko [1] , Jennifer Peterson [1] , Edward L. Clouser Jr. [1] , Ashley Smith [1] , Austin Hadley [2]

1. Radiation Oncology, Mayo Clinic 2. Radiation Oncology, Mayo Clinic, Jacksonville, USA

Corresponding author: Christopher Serago, serago.christopher@mayo.edu

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Abstract

Objectives: Angiogram-CT image registration of mask-based immobilization of patients is dependent upon use of localization frames and accurate replication of the patient position at the time of angiogram and CT scan. The position of clearly identified arteries on the angiogram and CT images were used as a quality assurance verification test of the accuracy of the angiogram-CT image registration.

Methods: 5 patients immobilized with a commercial (BrainLab) thermoplastic mask had angiograms and CT scans for treatment of arteriovenous malformations (AVM). The angiograms and CT scans were registered using localization frames with embedded fiducial markers. Clearly identified arteries were contoured on the angiogram and registered to the CT scan. The differences of the center of the correlated arteries were measured on multiple CT slices per case as an assessment of the accuracy of the image registration.

Results: The magnitude of the registration displacement of the arteries between the angiogram and CT images on any single CT image ranged from 0 to 4.7 mm for 5 patients evaluated. The average registration displacement per patient for all CT slices measured ranged from 0.8 to 2.3 mm. The registration displacements were translations and more complex 6 degrees of freedom shifts.

Conclusions: The use of artery position as a measure of angiogram-CT image registration accuracy for mask-based immobilization of AVM patients is an effective, efficient quality assurance verification test.

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